

# **A UAS SYSTEM FOR OBSERVING VOLCANOES AND NATURAL HAZARDS**

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## **ABSTRACT**

Fixed or rotary wing manned aircraft are currently the most commonly used platforms for airborne reconnaissance in response to natural hazards, such as volcanic eruptions, oil spills, wild fires, earthquakes. Such flights are very often undertaken in hazardous flying conditions (e.g., turbulence, downdrafts, reduced visibility, close proximity to dangerous terrain) and can be expensive. To mitigate these two fundamental issues--safety and cost--we are exploring the use of small (<100kg), relatively inexpensive, but effective, unmanned aerial vehicles (UAVs) for this purpose. As an operational test, in 2004 we flew a small autonomous UAV in the airspace above and around Stromboli Volcano. Based in part on this experience, we are adapting the RAVEN- INGV system for such natural hazard surveillance missions. RAVEN- INGV has a 50km range, with a 3.5m wingspan, main fuselage length of 4.60m, and maximum weight of 56kg. It has autonomous flight capability and a ground control station for mission planning and control. It will carry a variety of imaging devices, including a visible camera, and an IR camera.

Such flexible, capable, and easy-to-deploy UAV systems may significantly shorten the time necessary to characterize the nature and scale of the natural hazard threats if used from the outset of, and systematically during, natural hazard events. When appropriately utilized, such UAVs can provide a powerful new hazard mitigation and documentation tool for civil protection hazard responders. This research was carried out under the auspices of the Italian government, and, in part, under contract to NASA at the Jet Propulsion Laboratory.